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United States
Department of
Agriculture

Soil
Conservation
Service

Montana
Agricultural
Experiment
Station

Bozeman,
Montana

MONTANA WATER SUPPLY OUTLOOK

Snowpack and Streamflow
Forecasts as of
March 1, 1984



UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SNOW SURVEY UNIT
Federal Bldg., Rm. 443
10 East Babcock
Bozeman, MT 59715

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DID YOU MISS SOMETHING?

On the front page of the February 1 Water Supply Outlook for Montana, we asked for your help in identifying snow courses that you need for your operations.

If you missed the article or meant to respond but didn't, we can still incorporate your comments in the second phase of our study. Details are explained in the February 1 Outlook.

The Montana Water Supply Outlook is a publication of the U.S. Soil Conservation Service. The SCS administers the Cooperative Snow Survey Program in cooperation with other federal, state and private agencies, organizations, and individuals.

The report is prepared by SCS, Snow Survey and Water Supply Forecast Staff, Room 443, Federal Building, 10 East Babcock, Bozeman, Montana.



Drastic changes needed!

Small mountain ranges in central Montana showed some improvement in snowpack conditions but the rest of the State remained about the same or declined.

Most of the mountain headwaters have below to well below average accumulation of snow.

The area along the Continental Divide north of MacDonald Pass to Canada, has snow water content near record lows.

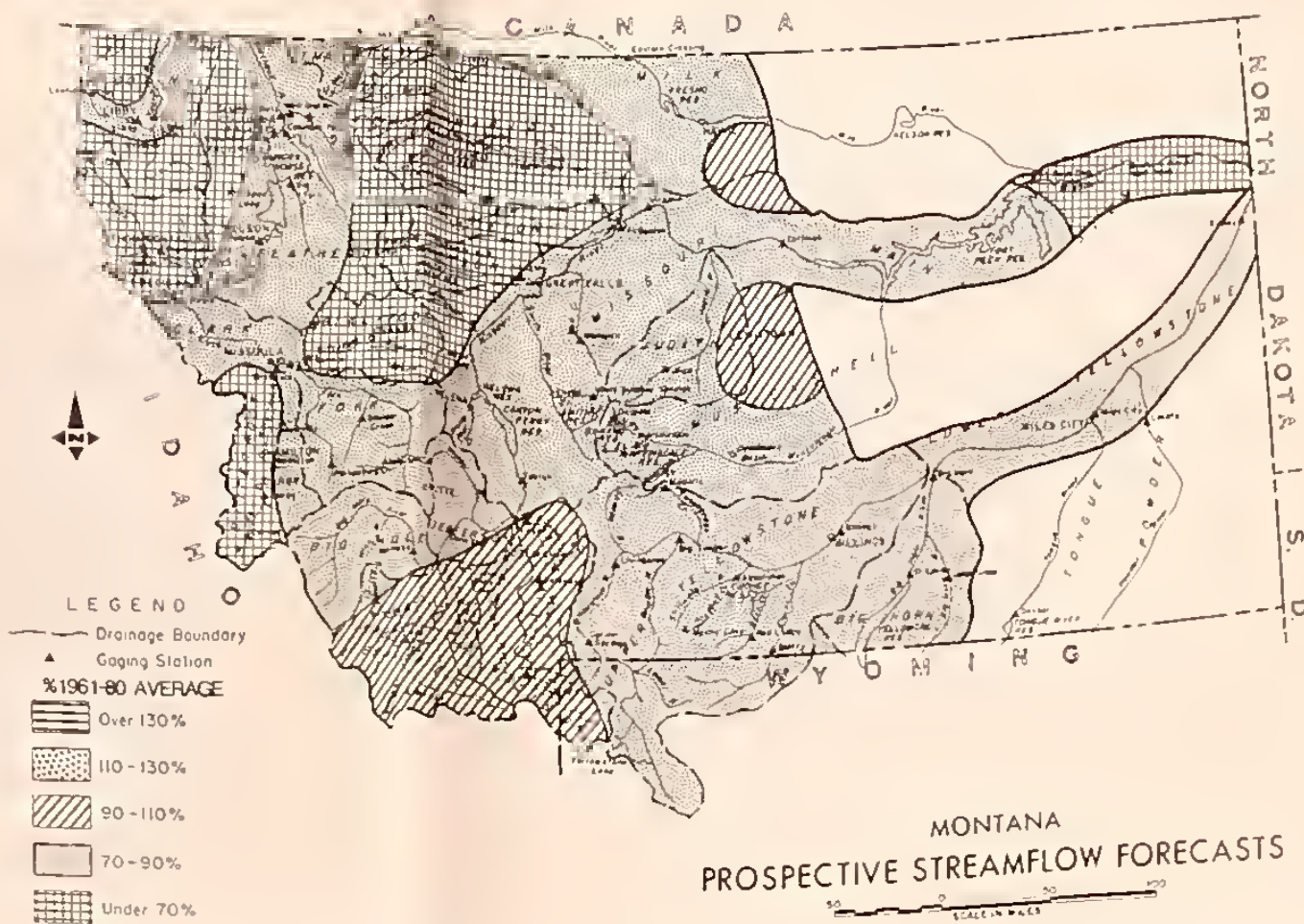
Over 80 percent of the snow accumulation season has passed. A drastic change in weather patterns will be required to show any major improvement in this year's snowpack. Usually the season's maximum accumulation of snow water levels occurs around mid-April.

The normally heavy snowfall areas in northwest Montana would require 200 to 300 inches of snowfall during March in order to reach average water content levels by the first of April.

Irrigation water shortages anticipated

The southwest corner of the State and two areas in central Montana will have near average to a little below average runoff. All other areas are forecast to have below to well below average water supply this spring and summer.

Irrigation shortages could vary from moderate to severe in these areas depending on water rights, stored water and temperatures and precipitation during the next few months. Weather patterns have not been favorable for picking up moisture since December. If this pattern continues through this summer, extensive water shortages can be anticipated.



Missouri River & Hudson Bay Drainages

STREAMFLOW FORECASTS

BASIN, STREAM and FORECAST POINT	THIS YEAR				PAST RECORD			
	FORECAST		PAST RECORD		FORECAST		PAST RECORD	
	THOUSAND ACRE FEET	PERCENT OF AVERAGE	THOUSAND ACRE FEET	PERCENT OF AVERAGE	THOUSAND ACRE FEET	PERCENT OF AVERAGE	THOUSAND ACRE FEET	PERCENT OF AVERAGE
	April - September				April - July			
BEAVERHEAD RIVER near Houlida (1)	102	99	186	103	96.0	100	159	96.3
BEAVERHEAD RIVER near Grant (2)	150	95	250	137	132	96	197	137
BEAVERHEAD RIVER at Brattis (2)	195	93		209	171	95		180
HUBY RIVER near Alder	105	104		101	90.0	106		84.6
HIG HOLL RIVER near Malone	570	75		760	520	74		698
BOULDER RIVER near Boulder	Streamflow measurements				discontinued			
WILLOW CREEK near Harrison	18.5	92		20.0	16.7	94		17.8
MADISON RIVER near Grayling (3)	454	92	532	496	357	92	408	388
MADISON RIVER near McAllister (4)	800	94	947	848	632	94	749	672
GALLATIN RIVER near Gateway	504	92	534	545	434	94	451	464
INFLUX MIDDLE CREEK RESERVOIR near Bozeman (5)	26.4	92	26.3	28.6	22.8	92	22.5	24.7
HYALITE CREEK near Bozeman (6)	40.5	90		44.8	35.4	91		38.7
GALLATIN RIVER at Logan	547	90		611	469	90		523
MISSOURI RIVER at Toston (7)	2137	84	2885	2,545	1841	84	2385	2,196
SHEEP CREEK near White Sulphur Springs	17.5	80	16.8	21.8	15.0	79	13.0	19.0
SUN RIVER at Gibbon Dam (8)	295	52	349	570	260	50	304	522
HELT CREEK near Monarch	102	76		134	95.0	77		123
MISSOURI RIVER at Fort Union (9)	2955	74		3,980	2560	74		3,468
TWO MEDICINE CREEK near Browning (10)	158	64		248	145	62		235
BAHGER CREEK near Browning	83.0	64		130	70.0	62		113
CUT BANK CREEK at Cut Bank	70.0	61		114	64.0	59		108
MARIAS RIVER near Shelby	290	54	247	542	270	52	232	518
MISSOURI RIVER at Virgile (11)	3235	71		4,570	3240	71		4,030
MISSOURI RIVER near Landusky (11)	3570	72		4,980	3150	72		4,383
NORTH FORK MISSISSAUGA RIVER near Delphi	4.6	72		6.2	3.8	70		5.4
SOUTH FORK MISSISSAUGA RIVER above Martinsdale	44.5	71		62.8	41.3	70		58.9
MISSOURI RIVER below Fort Peck Dam (11)	3440	69		4,961	3050	69		4,428
HILK RIVER at Eastern Crossing*	249	91		275				
HILK RIVER at Eastern Crossing (12)*	82.8	76		109				
INFLUX LAKE SAKAKAWA, ND (11)	9310	73		12,755	8475	73		12,239
SASKATCHEWAN RIVER BASIN								
SWITCHCREEK CREEK at Sherburne (13)	98.0	77	100	128	85.0	76	87.9	112
ST. MARY'S RIVER near Hobbs (13)	370	76		487	310	75		416

*March-September forecast

- (1) Adjusted for storage in Lima Reservoir.
- (2) Adjusted for storage in Lima and Clark Canyon Reservoirs.
- (3) Adjusted for storage in Hebgen Lake.
- (4) Adjusted for storage in Hebgen Lake and Ennis Lake.
- (5) Sum of West Fork Hyalite Creek and East Fork Hyalite Creek above the Reservoir.
- (6) Adjusted for storage in Middle Creek Reservoir.
- (7) Adjusted for storage in Lima, Hebgen, Ennis & Clark Canyon Reservoirs.
- (8) Adjusted for storage in Gibbon Reservoir & diversions.
- (9) Adjusted for storage in Lima, Clark Canyon, Hebgen, Ennis, Gibbon, Fishkum, Willow Creek & Canyon Ferry Reservoirs.
- (10) Adjusted for storage in Two Medicine Reservoir & diversions in Two Medicine Canal.
- (11) Adjusted for all upstream reservoirs.
- (12) Flow at Eastern Crossing minus St. Mary's Canal.
- (13) Adjusted for storage in Lake Sherburne.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

Short runoff period expected

The Missouri River drainage continues to show a large variation in projected runoff. The southwest corner of Montana can expect average to a little below average streamflows. This will decrease to very low runoff from the tributaries north and west of Great Falls.

With the low snowpacks in most areas, runoff is expected to occur over a much shorter period than usual.

Irrigation supplies in the Beaverhead, Ruby, Madison and Gallatin should be near to or a little below average. However, water users in all other drainages not having stored water can expect to see moderate to severe shortages as the irrigation season progresses.

Farmers and ranchers who do not have a good water supply should consider cropping or management alternatives that would be more in tune with the projected water shortages. Local Conservation District and County Extension offices are available to provide assistance.

Updated forecasts will be issued soon after April 1 snow surveys are completed.

WATER SUPPLY OUTLOOK			
Expressed as "Poor, Fair, Average, Excellent" with respect to Water Supply			
STREAM or AREA	Spring Season	Summer Season	Fall Season
Beaverhead	Fair	Fair	Fair
Ruby	Avg	Avg	Fair
Big Hole	Fair	Fair	Fair
Boulder	Fair	Poor	Fair
Jefferson	Fair	Fair	Fair
Madison	Fair	Fair	Fair
Gallatin	Fair	Fair	Fair
West-Side Missouri	Fair	Poor	Fair
Smith-Belt	Fair	Poor	Fair
Sun	Poor	Poor	Poor
Teton	Poor	Poor	Poor
Marias	Poor	Poor	Poor
Judith	Fair	Fair	Fair
Musselshell	Fair	Fair	Fair
Milk	Poor	Poor	Poor
Bear Paws	Avg	Avg	Fair
St. Mary's	Fair	Poor	Poor

Below average snowpack continues

Smaller mountain ranges in the central part of the State showed a slight improvement in snowpack conditions. However, the rest of the Missouri River drainage maintained about the same snow cover percentage or dropped a little from last month.

Many of the snow measurements along the Continental Divide from MacDonald Pass north, show near record lows for water content. Storm activity increased during the last week of February but was not enough to overcome 3 weeks of dry weather.

Even if precipitation becomes average for the next 2 months, most of the area will still have below average snowpack for the season.

Normally, about 82 percent of the season's snowpack is accumulated by March 1. The maximum levels of water stored in the snow usually occur around mid-April.



Snowpacks in some mountain ranges of southwest Montana are near average.

Yellowstone River Drainage

STREAMFLOW FORECASTS

BASIN, STREAM and FORECAST POINT	THIS YEAR				PAST RECORD			
	FORECAST		PAST RECORD		FORECAST		PAST RECORD	
	THOUSAND ACRE FEET	PERCENT OF AVERAGE	THOUSAND ACRE FEET	PERCENT OF AVERAGE	THOUSAND ACRE FEET	PERCENT OF AVERAGE	THOUSAND ACRE FEET	PERCENT OF AVERAGE
	April - September				April - July			
YELLOWSTONE RIVER at Corbin Springs	1670	82	1725	2,027	1390	82	1397	1,686
YELLOWSTONE RIVER near Livingston	1870	83		2,379	1617	82		1,969
BOULDER RIVER at Big Timber	298	75		398	275	75		366
STILLWATER near Absarokee (1)	494	78		632	410	78		528
CLARK'S FORK RIVER near Selfry	450	72		628	405	72		563
ROCK CREEK near Red Lodge	Streamflow measurements				discontinued by USGS			
INFLUX COONEY RESERVOIR near Boyd (2)	46.0	76		60.5	37.0	75		49.5
YELLOWSTONE RIVER at Billings	3517	81	3133	4,516	3062	80	3793	3,833
BIGHORN RIVER near St. Xavier (3)	1466	74	2060	1,976	1325	74	1849	1,794
LITTLE BIGHORN RIVER near Hardin	155	85		182	135	83		162
TONGUE RIVER near Decker	235	87		269	211	86		244
YELLOWSTONE RIVER at Miles City (4)	5286	78		6,787	4600	78		5,906
POWDER RIVER at Moorhead	213	81		263	196	81		243
YELLOWSTONE RIVER near Sidney (5)	5760	77		7,518	5040	77		6,544

- (1) Adjusted for storage in Mystic Lake.
- (2) Adjusted for storage in Cooney Reservoir.
- (3) Adjusted for storage in Buffalo Bill, Boysen, Bull Lake, Pilot Butte and Bighorn Reservoirs.
- (4) Adjusted for storage in Bull Lake, Buffalo Bill, Boysen, Pilot Butte, Bighorn and Tongue River Reservoirs.
- (5) Adjusted for reservoirs shown in (4) and diversions into the Lower Yellowstone Canal.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

Yellowstone snow-pack remains low

Snowpack conditions improved a little in the Crazy Mountains but remained about the same or dropped in other areas.

The headwaters of the Yellowstone River in Yellowstone National Park have well below average levels of water stored in the snowpack. Storms began moving through the area near the end of February but were not intensive enough to overcome earlier dry periods.

The outlook for March is not favorable for any significant improvement in the snowpack.

WATER SUPPLY OUTLOOK		
Expressed as "Poor, Fair, Average, Excellent" with respect to Water Supply		
STREAM or AREA	Spring Season	Fall Season
Yellowstone at Livingston	Fair	Poor
Shields	Fair	Fair
Boulder	Fair	Poor
Sweetgrass - Big Timber	Avg	Fair
Stillwater	Fair	Poor
Rock Creek	Fair	Poor
Clark's Fork	Fair	Poor
Yellowstone above Bighorn	Fair	Poor
Bighorn	Fair	Fair
Little Bighorn	Fair	Fair
Tongue	Fair	Fair
Powder	Fair	Fair
Lower Yellowstone	Fair	Fair

Water shortages expected

All streams in the Yellowstone drainage are forecast to have runoff in the 70 to 85 percent of average range. With the shortages of high elevation snowpack, streamflows are expected to drop off faster and sooner than usual.

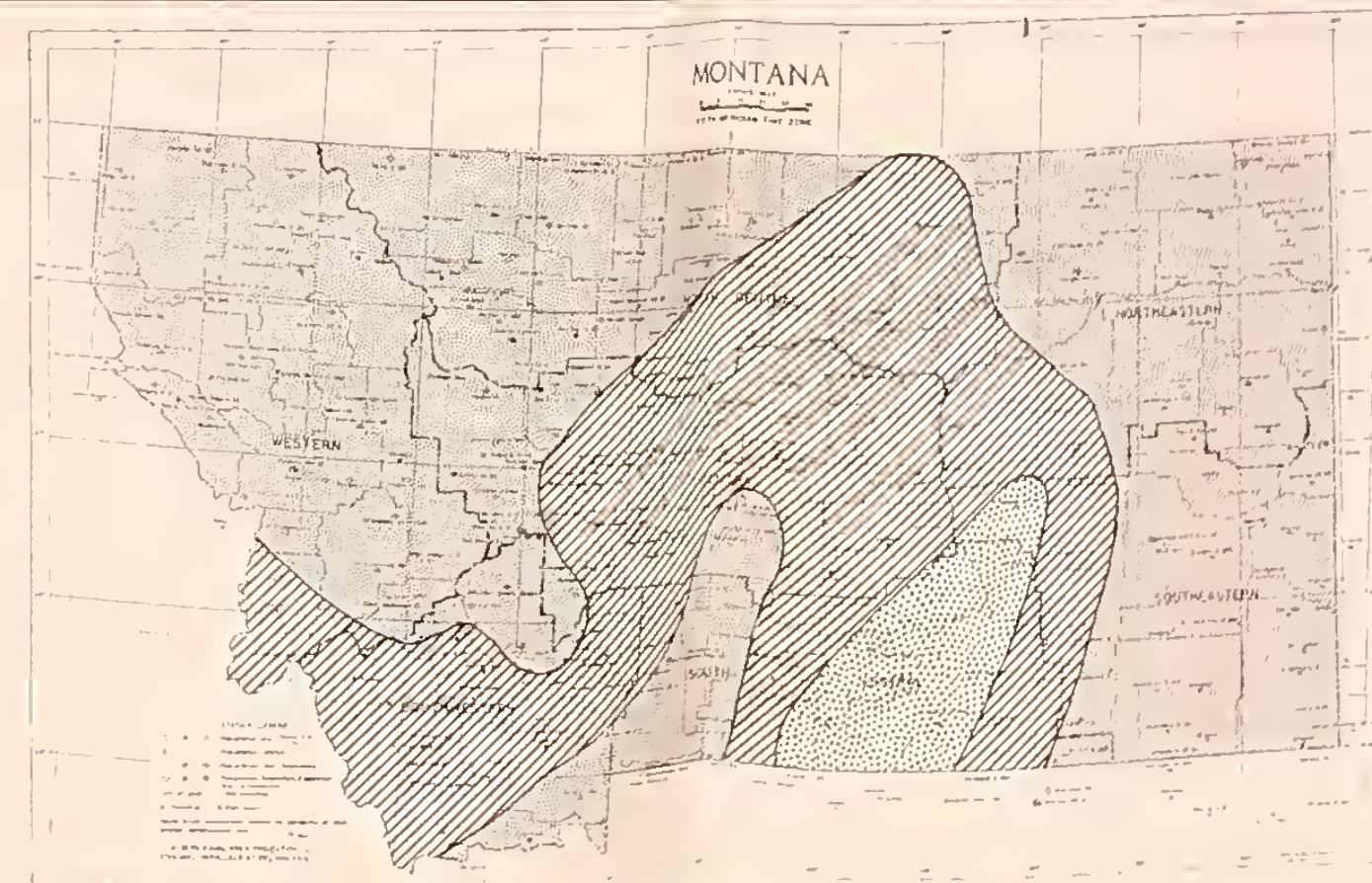
This will create some moderate to severe shortages of irrigation water supplies on smaller streams during the main irrigation season. Irrigators not having stored water should be prepared to get by with less water than usual or should change their operations to adjust to this reduced supply. Assistance is available from local Conservation District and County Extension offices.

Streamflow forecasts will be updated soon after completion of the April 1 snow surveys.



YELLOWSTONE RIVER DRAINAGE
MONTANA
MOUNTAIN SNOW WATER EQUIVALENT

SUMMARY of SNOW MEASUREMENTS				
COMPARISON WITH PREVIOUS YEARS				
RIVER BASIN or SUB-DRAINAGE	Number of Courses Averaged	THIS YEAR'S SNOW WATER AS PERCENT OF		
		Last Year	1984	1985
Upper Yellowstone				
ab Livingston	21	88	69	
Shields	10	102	78	
Boulder & Stillwater	6	98	68	
Rock Creek & Clark's Fork	16	85	70	
Yellowstone (ab Bighorn River)	53	91	71	
Bighorn/Wyoming	29	96	77	
Little Bighorn	3	86	78	
Bighorn (Total)	32	95	77	
Tongue	9	95	80	
Powder	5	89	70	
Yellowstone (Total)	99	92	73	



VALLEY PRECIPITATION
FEBRUARY 1984

Source: NWS
Great Falls, MT

SNOW SURVEY DATA

NAME	Elevation	THIS YEAR			PAST RECORD	
		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	Average
ABUNDANCE LAKE	8800	3/02	50	13.4	15.9	17.6
AMROSE	6480	2/24	35	8.2	9.4	11.8
ARCH FALLS	7350	2/27	36	9.4	7.8	10.7
ASHLEY DIVIDE	4820	2/24	18	3.3	4.8	6.9
ASHLEY LAKE	4000	2/24	15	3.3	4.9	6.3
BADGER PASS	6900	2/29	58	19.7	24.3	35.3
BADGER PASS PILLOW	6900	3/01	SP	16.6	19.6	28.1
BALD EAGLE PEAK	5700	2/27	88	33.2	42.9	54.8
BALD RIDGE	7500	2/29	42	10.5	8.6	11.3
BANFIELD MOUNTAIN	5600	2/27	34	9.0	20.3	21.6
BANFIELD MOUNTAIN PILLOW	5600	2/27	SP	8.6	18.9	17.0
BARRE CREEK	5500	2/28	68	24.6	38.9	42.5
BARRE MIDWAY	4600	2/28	52	14.5	30.6	33.4
BARRE TRAIL	3800	2/28	11	2.5	4.8	9.6
BARKER LAKES PILLOW	6200	3/01	SP	8.9	14.6	13.1
BASIN CREEK	7180	2/27	27	4.7	7.4	6.7
BASIN CREEK PILLOW	7180	3/01	SP	5.0	6.1	6.0
BASSOON PEAK	5150	3/01	13	3.2	7.2	9.7
BEAGLE SPRINGS	8850	3/01	32	5.8	7.0	7.2
BEAGLE SPRINGS PILLOW	8850	3/01	SP	6.5	5.9	6.5
BEAR BASIN	8150	2/28	53	16.0	16.2	18.8
BEAR PAW SKI AREA	5200	2/28	23	7.0	3.8	6.8
BEAVER LAKE	7000	2/29	35	10.4	13.4	21.0
BERRY MEADOW	7000	2/28	18	4.8	6.2	7.2
BIG CREEK	6750	2/28	85	29.4	38.3	39.1
BIG SKY	7100	2/28	46	12.6	12.6	13.5
BIG SKY MEADOW	6350	2/28	36	9.6	7.8	9.0
BIG SNOW	7150	2/29	59	19.2	12.5	18.2
BLACK BEAR	7950	2/27	89	30.0	39.7	35.3
BLACK OAK PILLOW	7950	3/01	SP	25.8	33.2	31.6
BLACK MOUNTAIN	7750	3/02	46	12.4	11.2	12.3
BLACK PINE	7100	2/29	29	6.8	9.0	12.5
BLACK PINE PILLOW	7100	3/01	SP	8.0	8.6	12.5
BLOODY DICK	7600	2/28	36	9.2	10.5	12.1
BLOODY DICK PILLOW	7550	3/01	SP	5.4	9.7	10.7
BLUE LAKE	5900	2/29	38	11.9	17.0	23.7
BOOTS SOTS	7750	2/27	30	5.9	5.8	6.6
BOULDER MOUNTAIN	7950	2/24	53	15.2	14.4	16.9
BOULDER MOUNTAIN PILLOW	7950	3/01	SP	16.3	16.8	18.2
BOX CANYON	6670	2/28	26	6.8	7.2	10.9
BOX CANYON PILLOW	6700	3/01	SP	6.2	5.3	8.1
BOXFELDER CREEK	5100	2/28	26	7.2	5.6	7.9
BRANHAM LAKES	8850	3/02	79	25.6	25.2	25.7
BRIDGER BOWL	7250	2/29	64	20.2	16.5	24.0
BRIDGER BOWL PILLOW	7250	2/29	SP	17.8	16.5	22.0
ORISHOW CREEK	3900	2/27	15	4.2	9.0	11.6
BRUSH CREEK TIMBER	5000	2/27	20	5.0	7.6	9.4
BULL MOUNTAIN	6600	2/28	18	4.1	5.8	5.2
CABIN CREEK	5200	2/27	1	0.1	3.2	6.8
CALL ROAD	8050	3/01	38	10.0	10.2	10.0
CALVERT CREEK	6430	2/27	30	6.6	9.6	10.5

NAME	Elevation	THIS YEAR			PAST RECORD	
		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	Average
CALVERT CREEK PILLOW	6430	3/01	SP	4.9	7.6	8.8
CAMP MISENY	6400	2/29	105	37.6	40.8	42.5
CAMP SENIA	7890	2/27	22	4.7	3.8	5.1
CARROT BASIN	9000	2/28	76	26.0	31.6	31.7
CARROT BASIN PILLOW	9000	3/01	SP	21.2	26.4	24.0
CASHE CREEK PILLOW	7800	3/01	SP	7.4	7.8	6.8
CEDAR GROVE	3760	2/27	24	5.9	9.0	11.4
CHESSMAN RESERVOIR	6200	2/28	7	1.0	5.2	3.5
CHICKEN CREEK	4060	2/27	35	8.5	12.0	15.0
CLOVER MEADOW	8600	3/01	49	13.2	14.4	14.6
CLOVER MEADOW PILLOW	8600	3/01	SP	15.6	10.3	13.5
COLE CREEK	7850	2/24	50	13.0	13.6	14.3
COLE CREEK PILLOW	7850	3/01	SP	12.5	13.6	12.6
COLLEY CREEK	6300	2/29	24	5.0	3.9	7.8
COMBINATION	5600	2/28	17	3.6	4.2	5.7
COMBINATION PILLOW	5600	3/01	SP	3.7	4.2	5.3
COOKE STATION	8150	2/27	43	11.6	15.4	17.8
COPPER BOTTOM	5200	2/21	15	5.4	7.7	11.0
COPPER BOTTOM PILLOW	5200	3/01	SP	6.0	8.4	11.5
COPPER CAMP	6950	2/28	38	12.9	21.1	28.3
COPPER CAMP PILLOW	6950	3/01	SP	13.8	21.6	33.6
COPPER CREEK	5700	2/28	15	5.2	12.0	14.3
COPPER LAKE CREEK	6100	2/28	29	9.4	16.9	22.4
COPPER MOUNTAIN	7700	3/01	32	7.6	8.2	9.7
COTTONWOOD CREEK	6400	3/02	24	5.3	5.2	6.8
COYOTE HILL	4200	2/28	24	6.8	7.7	10.0
CREVICE MOUNTAIN	8400	2/28	30	7.3	7.6	9.7
CRYSTAL LAKE	6050	2/29	42	12.2	8.2	12.2
CRYSTAL LAKE PILLOW	6050	3/01	SP	11.7	8.3	11.0
DAD CREEK LAKE	8400	3/01	43	9.6	9.8	11.5
DAISY PEAK	7600	3/01	27	6.2	6.2	10.1
DAILY CREEK	5780	2/25	30	7.9	8.5	10.6
DAILY CREEK PILLOW	5780	3/01	SP	3.5	8.9	11.4
DARKHORSE LAKE	8600	3/03	55	17.8	18.8	22.6
DARKHORSE LAKE PILLOW	8700	3/01	SP	17.0	14.8	19.6
DAVIS CREEK	5400	2/27	45	12.6	22.7	22.5
DEADMAN CREEK	6450	3/01	29	7.3	6.8	10.6
DEADMAN CREEK PILLOW	6450	3/01	SP	6.6	5.9	9.8
DESERT MOUNTAIN	5600	2/27	33	8.9	12.6	14.2
DEVILS SLOPE	8100	2/27	60	17.1	16.0	19.4
DISCOVERY BASIN	7050	2/27	30	7.4	6.8	9.2
DIVIDE	7800	3/01	37	9.6	11.3	9.9
DIVIDE PILLOW	7800	3/01	SP	8.6	10.2	9.2
DIX HILL	6400	2/26	28	6.8	7.8	10.7
DUPUYER CREEK PILLOW	5750	3/01	SP	3.7	-	-
EAST FORK R.S.	5400	2/27	18	4.7	4.6	6.6
EL DORADO MINE	7800	2/27	57	14.0	15.0	18.2
ELK HORN SPRINGS	7800	3/02	27	4.8	6.6	8.4
ELK PEAK	8000	2/27	47	11.8	10.3	14.7
EMERY CREEK	4350	2/27	38	10.2	13.9	14.0
EMERY CREEK PILLOW	4350	3/01	SP	9.2	14.1	16.4
FATTY CREEK	5500	2/28	55	16.5	19.4	20.9
FISH CREEK	8000	2/27	29	5.2	8.8	8.2
FISHER CREEK	9100	2/27	72	23.5	26.5	34.1
FISHER CREEK PILLOW	9100	3/01	SP	22.1	25.3	31.6
FIVE-BULL	5700	2/28	1	0.2	3.6	6.5
FLATIRON MOUNTAIN PILLOW	6300	3/01	SP	26.7	39.1	43.0
FLEECER RIDGE	7500	2/24	26	6.3	8.4	9.9
FOOLHEN	8280	3/02	40	8.6	12.0	15.0
FOUR MILE	6900	3/01	24	5.8	7.8	7.4
FOURTH OF JULY	3450	2/27	19	4.4	7.6	9.9

NAME	Elevation	THIS YEAR			PAST RECORD	
		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	Average
FRED BURR PASS	8000	2/29	61	17.6	17.4	22.1
FREIGHT CREEK	6000	2/29	21	6.1	8.7	13.8
FRIDAY HILL	4620	2/27	42	10.8	22.4	22.9
FROHNER MEADOWS	6480	2/28	17	4.2	6.6	7.1
FROHNER MEADOWS PILLOW	6480	3/01	SP	5.3	6.2	6.7
GARVER CREEK	4250	2/27	21	5.0	10.3	10.7
GARVER CREEK PILLOW	4250	3/01	SP	4.5	9.6	9.5
GIBBONS PASS	7100	2/27	58	17.0	21.3	20.7
GOAT MOUNTAIN	7000	2/28	13	3.5	5.5	10.2
GOLD CREEK LAKE	7200	2/27	45	9.8	10.9	13.5
GOLD STONE	8100	2/28	45	12.0	12.9	15.1
GRASSHOPPER	7000	2/27	19	4.1	4.2	5.3
GRAVE CREEK	4300	2/27	32	8.9	18.2	16.7
GRAVE CREEK PILLOW	4300	3/01	SP	9.4	16.0	16.4
GRIFFIN CREEK DIVIDE	5150	3/01	22	5.0	8.2	11.1
GUNSLIGHT LAKE	6300	2/29	68	24.5	28.8	36.9
HAND CREEK	5030	2/27	30	6.8	9.6	12.7
HAND CREEK PILLOW	5030	3/01	SP	5.7	4.8	13.6
HAWKINS LAKE	6450	2/27	52	15.9	29.6	28.2
HAWKINS LAKE PILLOW	6450	3/01	SP	13.2	23.2	26.8
HEART LAKE TRAIL	4800	2/29	40	13.2	15.4	20.3
HEBGEN DAM	6550	2/29	39	10.8	13.0	11.3
HELL ROARING DIVIDE	5770	2/29	62	20.5	22.2	28.4
HERRIG JUNCTION	4850	2/27	53	14.4	22.6	24.4
HOLBROOK	4530	3/02	15	3.9	6.4	9.6
HOOD MEADOW	6600	2/27	31	8.0	6.1	9.6
HOODOO BASIN	6050	2/29	89	33.2	40.4	44.6
HOODOO BASIN PILLOW	6050	3/01	SP	26.3	36.0	40.0
HOODOO CREEK	5900	2/29	79	30.0	36.6	41.8
INDEPENDENCE	7850	2/28	39	11.1	10.8	16.8
INTERGAARD	6450	3/02	18	4.2	4.8	7.6
JAHNKE LAKE TRAIL	7200	2/28	31	6.6	8.4	8.9
JOHNSON PARK	6450	3/01	15	3.2	3.9	7.2
KEELER CREEK	3300	2/27	23	5.8	11.3	14.3
KINGS HILL	7500	3/01	36	9.0	7.7	12.2
KISHENEH	3890	2/28	16	3.3	6.0	8.3
KIWANIS CAMP	3720	2/28	9	2.2	4.0	2.1
KRAFT CREEK PILLOW	4750	3/01	SP	9.2	11.1	12.5
LAKE CREEK	6100	3/01	33	7.8	8.3	8.0
LAKEVIEW CANYON	6930	2/27	28	6.8	12.8	10.4
LAKEVIEW RIDGE	7400	2/27	28	7.0	12.8	9.3
LAKEVIEW RIDGE PILLOW	7400	3/01	SP	8.6	13.9	10.7
LEMHI PASS	7480	3/03	38	6.1	5.2	8.0
LEMHI RIDGE	8100	3/03	40	7.2	6.4	8.9
LEMHI RIDGE PILLOW	8100	3/01	SP	5.1	6.2	9.0
LICK CREEK	6860	2/27	36	8.7	6.4	8.8
LICK CREEK PILLOW	6860	3/01	SP	7.1	6.0	7.7
LITTLE PARK	7400	2/28	45	12.2	11.7	14.4
LOGAN CREEK	4300	2/27	14	3.3	4.4	7.4
LOME MOUNTAIN	8880	2/28	60	18.4	18.6	19.6
LOST HORSE	5940	2/28	68	21.8	24.0	29.5
LOST SOUL	4800	2/27	26	6.4	14.5	15.0
LOWER TWIN	7900	3/01	52	16.1	18.5	18.6
LOWER TWIN PILLOW	7900	3/01	SP	14.4	18.3	17.1

SNOW March 1, 1984		THIS YEAR			PAST RECORD	
DRAINAGE BASIN and/or SNOW COURSE		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	Average
NAME	Elevation				Last Year	
LUBRECHT FLUME	4680	3/02	3	1.6	4.4	5.8
LUBRECHT FLUME PILLOW	4680	3/01	SP	3.2	4.9	5.2
LUBRECHT FOREST # 3	5450	3/01	13	3.6	4.8	7.0
LUBRECHT FOREST # 4	4650	3/01	3	1.2	2.0	3.5
LUBRECHT FOREST # 6	4040	3/01	2	0.9	2.3	4.2
LUBRECHT HYDROLOT	4200	3/02	11	3.0	4.6	6.6
MADISON PLATEAU	7750	2/27	54	15.3	21.9	19.4
MADISON PLATEAU PILLOW	7750	2/27	SP	14.1	22.0	20.6
MANY GLACIER	4900	2/29	32	9.6	15.9	18.8
MANY GLACIER PILLOW	4900	3/01	SP	9.2	14.7	17.8
MARIAS PASS	5250	2/29	24	7.2	14.0	15.9
MAYNARD CREEK	6210	2/29	40	10.7	10.3	14.1
MAYNARD CREEK PILLOW	6210	2/29	SP	7.8	7.8	10.5
MIDDLE HILL CREEK	7850	3/02	54	14.9	15.4	14.5
MILL CREEK	7500	2/29	35	7.5	7.2	11.7
MINERAL CREEK	4000	2/28	35	9.8	15.4	17.1
MONUMENT PEAK	8850	2/28	56	17.3	19.0	23.9
MONUMENT PEAK PILLOW	8850	3/01	SP	12.7	13.6	19.8
MOULTON RESERVOIR	6850	2/28	26	5.1	4.6	6.9
MOUNT LOCKHART	6400	2/29	37	10.6	14.6	20.8
MOUNT LOCKHART PILLOW	6400	3/01	SP	9.6	12.9	19.0
MUDD LAKE	7650	2/27	46	11.4	17.2	18.0
MULE CREEK	8300	3/02	35	8.8	10.7	11.3
MULE CREEK PTLOW	8350	3/01	SP	9.3	9.8	11.4
NEVADA CREEK	6480	2/28	27	6.7	9.5	11.1
NEVADA CREEK PILLOW	6480	3/01	SP	6.0	9.1	10.7
NEW WORLD	6900	2/29	42	11.4	9.8	13.0
NEWTON MOUNTAIN	5600	2/27	65	20.4	34.5	33.7
NEZ PERCE CAMP	5650	2/26	48	11.4	11.4	13.7
NEZ PERCE CAMP PILLOW	5650	3/01	SP	11.1	10.9	13.6
NEZ PERCE CREEK	6500	3/01	20	4.3	5.0	6.6
NEZ PERCE PASS	6570	2/26	51	14.0	11.7	15.4
NOISY BASIN	6040	2/29	102	36.8	37.5	37.9
NOISY BASIN PILLOW	6040	3/01	SP	30.9	34.6	33.1
NORTH FK. ELK CREEK	6250	3/02	28	6.3	8.8	11.0
NORTH FK. ELK CREEK PILLOW	6250	3/01	SP	6.7	8.5	10.5
NORTH FORK JOCKO	6330	2/28	92	31.6	34.6	40.8
NORTH MEADOW	7500	3/01	25	5.8	7.8	7.2
ORTHEAST ENTRANCE	7350	3/02	24	5.9	6.4	9.0
ORTHEAST ENTRANCE PILLOW	7350	3/01	SP	5.7	7.8	8.8
OTCH	8500	3/01	53	15.6	16.2	13.6
PHIR PARK	7150	2/26	42	11.4	14.4	15.4
ETERSON MEADOWS	7200	2/28	26	6.2	6.5	9.0
ETERSON MEADOWS PILLOW	7200	2/28	SP	6.4	6.6	8.7
ICKFOOT CREEK	6650	2/24	26	7.2	9.3	11.5
ICKFOOT CREEK PILLOW	6650	3/01	SP	6.5	7.9	10.2
IKE CREEK PILLOW	5930	3/01	SP	12.9	21.5	24.3
IPSTONE PASS	7200	3/01	13	3.0	3.5	4.4
LACER BASIN PILLOW	8830	3/01	SP	10.8	10.2	14.8
ORMMAN CREEK	5100	2/27	59	19.0	29.4	31.7
ORMMAN CREEK PILLOW	5100	3/01	SP	16.0	24.2	28.9
ORCUPINE	6500	2/29	24	6.0	5.0	6.8
ORCUPINE PILLOW	6500	3/01	SP	6.1	5.9	6.6
OTOMAGETON PARK	7150	2/28	44	11.1	13.4	13.6
ED MOUNTAIN	6000	3/01	36	10.0	16.8	17.2
ED TOP	5260	2/27	54	15.3	27.0	28.1
OCK CREEK	5600	2/29	39	11.3	6.8	8.3
OCK CREEK MEADOWS	8160	2/28	50	13.8	15.1	18.7
OCKER PEAK	8000	2/28	33	8.3	8.8	13.3
OCKER PEAK PILLOW	8000	3/01	SP	6.9	9.6	12.6
OCKY BOY	4700	2/28	14	4.4	1.4	4.5
OCKY BOY PILLOW	4700	2/28	SP	4.3	1.4	

Columbia River Drainage

STREAMFLOW FORECASTS

BASIN, STREAM, and FORECAST POINT	THIS YEAR		PREVIOUS YEAR		THIS YEAR		PREVIOUS YEAR		THIS YEAR		PREVIOUS YEAR	
	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual
	April - September				April - July				April - June			
KOOTENAI RIVER below Libby Dam (1)	5,540	79	6,356	7,041	4,740	79	5,346	6,020				
FISHER RIVER near Libby	165	62		264	150	60		248				
YAK RIVER near Troy	300	57		523	280	56		500				
KOOTENAI RIVER at Leona (1)	6,410	75	7,948	8,602	5,590	75	6,857	7,498	4540	75	5,157	6,051
UPPER MOUNTAIN RESERVOIR at BUTTE (Million Gallons)					184	70	182	263	165	70	179	237
WARM SPRINGS CREEK at MEYERS DAM near Anaconda (2)	35.7	76		46.8	28.7	76		37.8				
FLINT CREEK near Southern Cross (3)	13.2	72	18.9	18.3	11.0	71	15.2	15.4				
FLINT CREEK below Boulder Creek (4)	55.3	73		75.8	42.8	72		59.5				
UPPER LOWER WILLOW CREEK RESERVOIR near Hall (5)	9.4	60	11.6	15.7	8.8	59	10.2	14.9				
MIDDLE FORK ROCK CREEK near Philipsburg	59.0	75		78.2	53.0	75		70.5				
NEVADA CREEK near Finn	11.5	50		23.0	10.5	49		21.3				
BLACKFOOT RIVER near Bonner	680	68		999	600	66		904	515	66		782
CLARK FORK RIVER above Hilltown (6)	640	78		816	550	78		708	465	78		597
CLARK FORK RIVER above Missoula	1,320	73	1,362	1,815	1,150	71	1,133	1,612	980	71	880	1,379
WEST FORK BITTERROOT RIVER near Conner (7)	118	66		178	105	64		164				
BITTERROOT RIVER near Darby	395	68		580	350	66		532	305	66		464
SKALAKO CREEK near Hamilton	44.8	80		56.0	38.0	78		48.7				
BURNT FORK CREEK near Stevensville (8)	29.5	79		37.4	25.1	78		32.2				
BITTERROOT RIVER at Missoula (9)	1,010	67		1,504	920	66		1,384	790	66		1,191
CLARK FORK RIVER below Missoula	2,330	70		3,319	2,070	69		2,996	1,770	69		2,570
CLARK FORK RIVER at E. Regis	3,200	73	3,450	4,411	2,890	73	3,073	3,928	2,500	73	2,437	3,428
NORTH FORK FLATHEAD RIVER near Columbia Falls	1,435	75		1,913	1,280	74		1,732	1,090	74		1,471
MIDDLE FORK FLATHEAD RIVER near West Glacier	1,340	72		1,545	1,069	71		1,713	1,030	71	1,122	1,453
SOUTH FORK FLATHEAD RIVER near Columbia Falls (10)	1,670	73		1,847	2,278	72		1,715	1,242	72	1,416	1,886
FLATHEAD RIVER at Columbia Falls (10)	4,550	73		4,943	6,208	73		4,508	5,721	73	3,654	4,921
SWAN RIVER near Big Fork	535	78		689	470	78		604				
FLATHEAD RIVER near Polson (11)	5,300	73		6,130	7,278	73		5,538	6,712	73	4,420	5,759
CLARK FORK RIVER near Pluma (11)	8,340	69		9,880	12,153	70		8,748	11,071	69	6,902	9,459
THOMPSON RIVER near Thompson Falls	180	69		241	155	67		233				
PROSPECT CREEK at Thompson Falls	100	70		162	92.5	70		132				
CLARK FORK RIVER at Whitehorse Rapids (12)	9,250	68		13,575	8,420	68		12,351	7,185	68		10,570

- (1) Adjusted for storage in Lake Kootenai.
- (2) Adjusted for storage in Silver Lake, diversions to and pumping from Georgetown Lake.
- (3) Adjusted for storage in Georgetown Lake, diversions from and pumping to Silver Lake.
- (4) Sum of Clark Fork at Haville and Boulder Creek at Haville.
- (5) Sum of North Fork Lower Willow Creek near Hall and South Fork Lower Willow Creek near Hall.
- (6) Difference in observed flow Clark Fork above Missoula and Blackfoot near Bonner.

- (7) Adjusted for storage in Painted Rocks Reservoir.
- (8) Adjusted for diversion into Sunset Highway Canal.
- (9) Difference in observed flow Clark Fork above and below Missoula.
- (10) Adjusted for storage in Hungry Horse Reservoir.
- (11) Adjusted for storage in Hungry Horse Reservoir and Flathead Lake.
- (12) Adjusted for storage in Hungry Horse Reservoir, Flathead Lake and Noxon Rapids Reservoir.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

WATER SUPPLY OUTLOOK

STREAM or AREA	Flow Period	
	Spring Season	Late Season
Tobacco	Fair	Poor
Little Bitterroot	Fair	Poor
Mission Valley	Fair	Fair
Flint Creek	Fair	Fair
Upper Clark Fork	Fair	Fair
Nevada Creek	Fair	Poor
Blackfoot	Fair	Poor
West-side Bitterroot	Fair	Fair
East-side Bitterroot	Fair	Fair
Bitterroot River	Fair	Fair
Lower Clark Fork	Fair	Poor

Runoff forecast below average

Below average runoff is forecast for all drainages in the Columbia. Streamflows are expected to start receding much earlier than normal.

Shortages of irrigation water supplies could be moderate to severe on streams not having storage projects. Irrigators that do not have an early water right or stored water should consider changing operations or crops to reduce the impact of a short supply. Local Conservation District or County Extension offices can provide assistance.

Updated forecasts will be issued soon after the April 1 snow surveys are completed.

SUMMARY of SNOW MEASUREMENTS			
(COMPARISON WITH PREVIOUS YEARS)			
RIVER BASIN	Number of Gauging Stations	THIS YEAR'S SNOW WATER AS PERCENT OF	
SUB-WATERSHED	Average	Last Year	Average
East Kootenai/B.C.	25	101	66
Kootenai/Montana	30	59	54
Kootenai above			
Bombers Ferry...	55	72	59
Little Bitterroot	9	70	47
N. Fk. Flathead...	13	66	62
M. Fk. Flathead...	12	79	59
S. Fk. Flathead...	13	86	76
Swan	11	90	81
Flathead	58	80	68
Stillwater & Whitefish	9	73	57
Clark Fork above			
Blackfoot	42	82	67
Blackfoot	23	72	57
Upper Clark Fork			
above Missoula	65	78	63
Bitterroot	21	81	68
Lower Clark Fork			
below Missoula	19	71	63
Clark Fork (Total w/o Flathead)	105	76	64
Pend O'Reille			
(Clark Fork & Flathead)	163	78	66
Columbia (Pend O'Reille & Kootenai)	218	76	64

Deep snow needed

Snowpack improved slightly in the southern portions of the Clark Fork and Bitterroot but remained the same or declined in other areas.

Most snow courses along the Continental Divide in the Blackfoot and Flathead River drainages have water contents that are near minimum of record. The Swan and Thompson Mountains show a little better snow cover because of good early season snow.

If conditions that weather patterns may be changing and a little more moisture could be directed into this

area. However, it will take much above average snowfall over the next 2 months to make significant improvements in present conditions. For example, it would require about 300 inches of snowfall in the higher elevations of the Cabinet Mountains south of Libby during March to bring the present snowpack up to average by April 1.

In the Bitterroot Range, about 170 inches of snowfall would be needed while around 200 inches are needed in the headwaters of the Blackfoot.

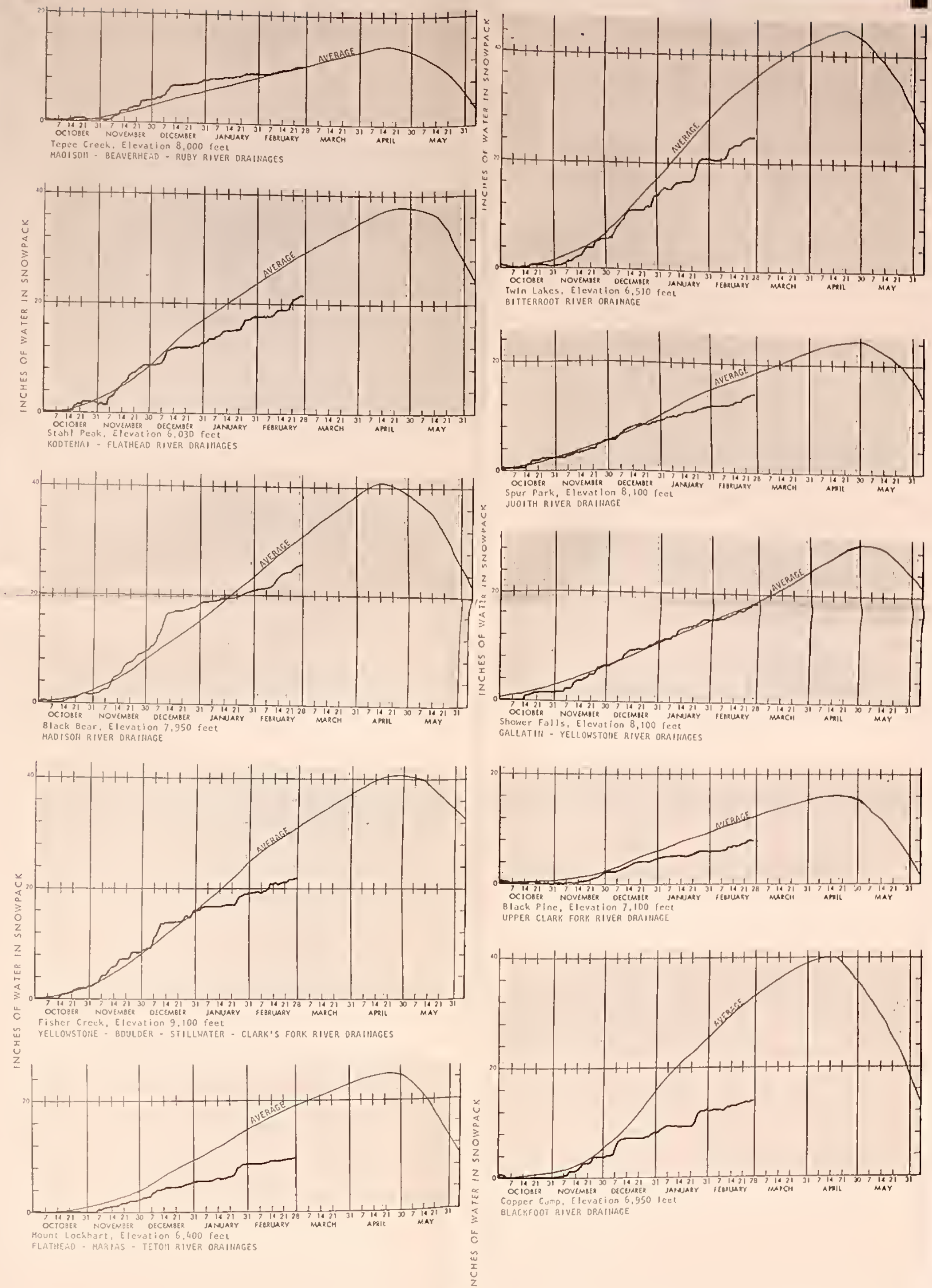


COLUMBIA RIVER DRAINAGE
MONTANA
MOUNTAIN SNOW WATER EQUIVALENT



Mountain streams are starting to lose their ice cover and will soon be ice-free.

SNOW PILLOW DATA

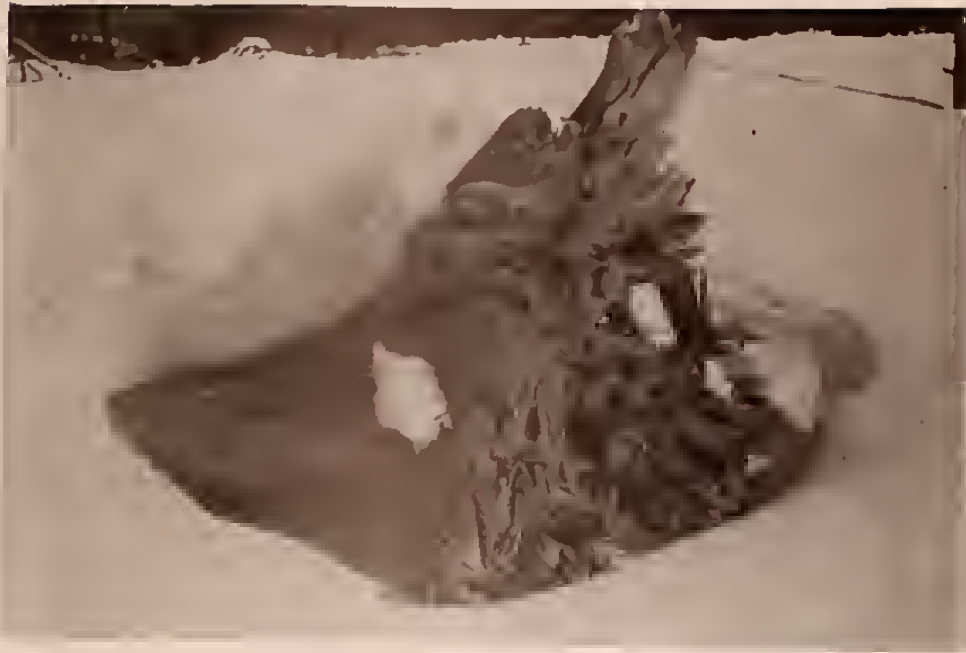


SATELLITE SNOW COVER



MISSOURI RIVER BASIN
Above
Canyon Ferry Dam

DATE	PERCENT SNOW	AVERAGE SNOWLINE ELEVATION IN FEET
November 29, 1983	99.1	3940
December 20, 1983	100	3800
January 9, 1984	72	5720
January 31, 1984	78	5440
February 8, 1984	74	5630
February 27, 1984	100	3800



Shallow snowpacks expose many obstacles not normally seen by winter travelers.

RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH February 29, 1984

Basin or Stream	RESERVOIR	Usable Capacity	Usable Storage		
			This Year	Last Year	Average
COLUMBIA					
Kootenai	Kootenai	5,748.2	2,789.0	2,190.0	---
Flathead	Hungry Horse	3,451.0	2,507.0	2,831.0	2,213.0
	Flathead Lake	1,791.0	787.4	752.8	934.1
	Camas (4)	45.2	29.5	31.2	12.3
	Mission Valley (8)	100.3	55.4	43.7	38.1
Clark Fork	Georgetown Lake	31.0	27.1	26.6	25.2
	Lower Willow Creek	4.9	3.3	1.6	1.6
	Nevada Creek	12.6	6.3	5.2	4.8
	Noxon Rapids	334.6	322.8	315.4	312.2
Bitterroot	Painted Rocks	31.7	---	---	16.1
	Como	34.9	23.9	---	12.6
MISSOURI					
Beaverhead	Lima	84.0	55.7	51.4	36.2
	Clark Canyon	257.2	171.8	165.0	141.2
Ruby	Ruby	38.8	27.8	27.6	26.7
Madison	Hebgen Lake	377.5	261.9	273.0	224.6
	Ennis Lake	41.0	31.2	30.7	35.7
Gallatin	Middle Creek	8.0	3.8	3.8	3.6
Missouri	Canyon Ferry	2,043.0	1,647.0	1,691.0	1,561.0
	Hauser & Helena	61.9	63.0	63.0	60.1
	Helena Valley	10.4	---	---	---
	Lake Helena	10.4	10.9	10.9	9.9
	Holter Lake	81.9	79.6	81.0	63.6
	Fort Peck Lake	18,910.0	15,900.0	15,640.0	14,830.0
Smith	Smith River	10.6	9.6	8.6	6.9
	Newman Creek	12.4	8.6	8.7	9.2
Musselshell	Bair	7.0	3.2	5.2	4.7
	Martinsdale	23.1	14.2	18.3	9.5
	Deadman's Basin	72.2	---	63.1	46.3
Snn	Gibson	99.1	54.7	61.8	43.9
	Willow Creek	32.2	24.3	24.2	20.1
	Pishkun	32.0	19.4	19.9	17.8
Marias	Lower Two Medicine	11.9	---	---	7.0
	Four Horns	19.2	---	---	12.5
	Swift	30.0	13.1	14.9	15.2
	Lake Frances	111.9	47.2	85.1	70.1
Milk	Elwell (Tiber)	1,347.0	695.0	693.7	542.1
	Beaver Creek	3.5	3.1	3.1	1.7
	Fresno	127.2	24.6	13.2	58.5
	Nelson	66.8	39.1	44.4	38.7
HUDSON BAY					
St. Mary's	Lake Sherburne	64.3	35.2	35.8	21.9
YELLOWSTONE					
Stillwater	Nystic Lake	21.0	4.4	3.9	7.3
Clark's Fork	Cooney	27.4	17.0	17.6	14.6
Tongue	Tongue River	68.0	15.2	18.4	34.4
Bighorn	Bighorn Lake	1,356.0	839.0	962.6	590.4

AGENCIES AND ORGOANIZATIONS COOPERATING IN MONTANA SNOW SURVEYS

GOVERNMENT AGENCIES

Canada

- Department of the Environment
- Atmospheric Environment Service
- Water Management Service
- British Columbia Ministry of Environment
- Inventory and Engineering Branch, Hydrology Section
- Alberta Environment
- Technical Services Division

Federal

- Department of the Army - Corps of Engineers
- Department of Agriculture - Forest Service
- Soil Conservation Service
- Department of Commerce - National Environmental Satellite Service
- National Weather Service
- Department of Interior - Bureau of Indian Affairs
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Reclamation
- Department of Energy - Bonneville Power Administration

STATE AGENCIES

- Montana Conservation Districts
- Montana Department of Fish, Wildlife and Parks
- Montana Department of Natural Resources and Conservation
- Montana State University - Agricultural Experiment Station
- University of Montana - School of Forestry

PRIVATE ORGANIZATIONS

- The Anaconda Company
- Big Sky of Montana
- Butte Water Company
- Flathead Valley Community College
- Montana Power Company
- Pondera County Canal & Reservoir Company

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

